

Claims

- [c1] A high quality factor (Q) BEOL (back end of line) inductor element with a dynamically driven, patterned shield comprising:
- a BEOL inductor element fabricated spaced from a conductive substrate;
 - a patterned conductive shield structure provided between the BEOL inductor element and the conductive substrate, wherein the patterned shield structure is dynamically driven to the same electrical potential as the BEOL inductor element, to reduce or eliminate parasitic capacitive coupling between the BEOL inductor element and the conductive substrate, and wherein the patterned shield structure is patterned to form a plurality of conductive segments which are selectively insulated from each other, such that eddy currents cannot flow from one conductive segment to an adjacent conductive segment, to prevent the flow of eddy currents in the patterned shield structure, and wherein the conductive segments are electrically connected together to be dynamically driven to the same electrical potential as the BEOL inductor element.

- [c2] The BEOL inductor element of claim 1, wherein the BEOL inductor element is fabricated with an additional buffer element which dynamically drives the patterned shield structure to the same electrical potential as the BEOL inductor element.
- [c3] The BEOL inductor element of claim 2, wherein the buffer element comprises a high input impedance unity gain circuit.
- [c4] The BEOL inductor element of claim 3, wherein the high input impedance unity gain circuit comprises an emitter or source follower circuit.
- [c5] The BEOL inductor element of claim 1, wherein the patterned shield structure is geometrically larger than the BEOL inductor element.
- [c6] The BEOL inductor element of claim 5, wherein the patterned shield structure extends beyond outer lateral edges of the BEOL inductor element by a distance equal to or greater than a distance separating the BEOL inductor element and the patterned shield structure.
- [c7] The BEOL inductor element of claim 1, wherein the BEOL inductor element comprises a square or rectangular shaped spiral BEOL inductor element, and the patterned shield structure comprises a square or rectangular

shaped shield structure which is geometrically larger, having a larger length and a larger width than the square or rectangular shaped spiral BEOL inductor element.

- [c8] The BEOL inductor element of claim 7, wherein the patterned shield structure extends beyond outer lateral edges of the BEOL inductor element by a distance equal to or greater than a distance separating the BEOL inductor element and the patterned shield structure.
- [c9] The BEOL inductor element of claim 7, wherein the patterned shield structure is selectively patterned into conductive segments and non-conductive segments and the conductive segments extend from outer lateral edges of the patterned shield layer toward a center of the patterned shield layer to form a plurality of individual conductive segments which are insulated from each other such that eddy currents cannot flow from one conductive segment to another conductive segment.
- [c10] The BEOL inductor element of claim 9, wherein the conductive segments are connected together by a central conducting element which electrically connects the conductive segments together.
- [c11] The BEOL inductor element of claim 1, wherein the BEOL inductor element comprises a BEOL spiral octagonal

shaped inductor element having a series of linear conductor segments separated by substantially 45 degree angular bends, such that the series of linear conductor segments and angular bends enable the inductor element to convolute within itself and terminate in an inner end near a center of the convoluted spiral inductor element.

- [c12] The BEOL inductor element of claim 11, wherein the patterned shield structure is larger in area than the area of the BEOL spiral inductor element and extends beyond outer lateral edges of the BEOL spiral inductor element to shield the BEOL inductor element from the conductive substrate.
- [c13] The BEOL inductor element of claim 12, wherein the patterned shield structure extends beyond the outer lateral edges of the BEOL inductor element by a distance equal to or greater than a distance separating the BEOL inductor element and the patterned shield structure.
- [c14] The BEOL inductor element of claim 12, wherein the patterned shield structure is patterned into conductive segments and non-conductive segments and the conductive segments extend radially from the outer lateral edges of the patterned shield structure toward the center of the patterned shield structure to form a plurality of individ-

ual conductive segments which are insulated from each other such that eddy currents cannot flow from one conductive segment to another conductive segment.

[c15] The BEOL inductor element of claim 14, wherein the conductive segments are electrically connected together at a central connecting point to enable the patterned shield structure to be dynamically driven to the same electrical potential as the BEOL inductor element.

[c16] The BEOL inductor element of claim 1, wherein the BEOL inductor element comprises a BEOL spiral polygon shaped inductor element having a series of linear conductor segments separated by angular bends, such that the series of linear conductor segments and angular bends enable the inductor element to convolute within itself and terminate in an inner end near a center of the convoluted spiral inductor element.

[c17] The BEOL inductor element of claim 16, wherein the patterned shield structure is larger in area than the area of the BEOL spiral inductor element and extends beyond outer lateral edges of the BEOL spiral inductor element to shield the BEOL inductor element from the conductive substrate.

[c18] The BEOL inductor element of claim 17, wherein the pat-

terned shield structure extends beyond the lateral edges of the BEOL inductor element by a distance equal to or greater than a distance separating the BEOL inductor element and the patterned shield structure.

- [c19] The BEOL inductor element of claim 18, wherein the patterned shield structure is patterned into conductive segments and non-conductive segments and the conductive segments extend radially from the outer lateral edges of the patterned shield structure toward a center of the patterned shield structure to form a plurality of individual conductive segments which are insulated from each other such that eddy currents cannot flow from one conductive segment to another conductive segment.
- [c20] The BEOL inductor element of claim 19, wherein the conductive segments are electrically connected together at a central connecting point on the patterned shield structure to enable the patterned shield structure to be dynamically driven to the same electrical potential as the BEOL inductor element